

OXIDATION OF METALS—VOLUME 26, 1986

A journal which provides a single forum for scientific contributions dealing with all aspects of gas-solid reactions. It includes results of experimental and theoretical work; review papers will be published occasionally

Editor

D. L. Douglass
Materials Department
University of California at Los Angeles
Los Angeles, California

Associate Editors

J. B. Wagner, Jr.
Center for Solid State Science
Arizona State University
Tempe, Arizona

G. C. Wood
Corrosion and Protection Centre
University of Manchester Institute of Science
and Technology
Manchester, England

International Advisory Board

J. Bénard
Université de Paris
Paris, France

C. E. Birchenall
University of Delaware
Newark, Delaware

J. V. Cathcart
Oak Ridge National Laboratory
Oak Ridge, Tennessee

G. Gesmundo
Facoltà di Ingegneria
Università di Genova
Genova, Italy

M. J. Graham
National Research Council of Canada
Ottawa, Ontario, Canada

D. R. Holmes
Central Electricity Research Laboratories
Leatherhead, Surrey, England

P. Kofstad
University of Oslo
Oslo, Norway

S. Mrowec
Institute of Materials Science
School of Mining and Metallurgy
Krakow, Poland

K. Nishida
Hokkaido University
Sapporo, Japan

F. S. Pettit
University of Pittsburgh
Pittsburgh, Pennsylvania

A. Rahmel
DECHEMA
Frankfurt am Main, West Germany

R. A. Rapp
Ohio State University
Columbus, Ohio

J. Sheasby
University of Western Ontario
London, Ontario, Canada

W. W. Smeltzer
McMaster University
Hamilton, Ontario, Canada

J. Stringer
Electric Power Research Institute
Palo Alto, California

D. J. Young
University of New South Wales
Kensington, New South Wales, Australia

G. J. Yurek
Massachusetts Institute of Technology
Cambridge, Massachusetts

Published bimonthly at 71 Winterstoke Road, Bristol BS3 2NT, England, by Plenum Publishing Corporation, 233 Spring Street, New York, N.Y. 10013. In 1986, Volumes 25 and 26 (6 issues each) will be published. Subscription orders should be addressed to the publisher. *Oxidation of Metals* is abstracted or indexed in Chemical Abstracts, Chemical Titles, Corrosion Abstracts, Current Contents, Energy Research Abstracts, Engineering Index, Metals Abstracts Index, Referativnyi Zhurnal, Science Citation Index, and Solid State Abstracts Journal. © 1986 Plenum Publishing Corporation. *Oxidation of Metals* participates in the Copyright Clearance Center (CCC) Transactional Reporting Service. The appearance of a code line at the bottom of the first page of an article in this journal indicates the copyright owner's consent that copies of the article may be made for personal or internal use. However, this consent is given on the condition that the copier pay the flat fee of \$5.00 per copy per article (no additional per-page fee) directly to the Copyright Clearance Center, Inc., 27 Congress Street, Salem, Massachusetts 01970, for all copying not explicitly permitted by Sections 107 or 108 of the U.S. Copyright Law. The CCC is a nonprofit clearinghouse for the payment of photocopying fees by libraries and other users registered with the CCC. Therefore, this consent does not extend to other kinds of copying, such as copying for general distribution, for advertising or promotional purposes, for creating new collective works, or for resale, nor to the reprinting of figures, tables, and text excerpts. 0030-770X/86 \$5.00

Subscription rates:

Volumes 25 and 26, 1986 (6 issues each) \$212.50 per volume (outside the U.S., \$237.00 per volume).

Volumes 27 and 28, 1987 (6 issues each) \$227.50 per volume (outside the U.S., \$253.50 per volume).

Second-class postage paid at Jamaica, N.Y. 11431. Postmaster: Send address changes to *Oxidation of Metals*, Plenum Publishing Corporation, 233 Spring Street, New York, N.Y. 10013. Air freight and mailing in the USA by Publications Expediting, Inc., 200 Meacham Avenue, Elmont, N.Y. 11003.

Printed in Great Britain.

Oxidation of Metals is published bimonthly at 71 Winterstoke Road, Bristol BS3 2NT, England, by Plenum Publishing Corporation, 233 Spring Street, New York, N.Y. 10013. In 1986, Volumes 25 and 26 (6 issues each) will be published. Subscription orders should be addressed to the publisher. *Oxidation of Metals* is abstracted or indexed in Chemical Abstracts, Chemical Titles, Corrosion Abstracts, Current Contents, Energy Research Abstracts, Engineering Index, Metals Abstracts Index, Referativnyi Zhurnal, Science Citation Index, and Solid State Abstracts Journal. © 1986 Plenum Publishing Corporation. *Oxidation of Metals* participates in the Copyright Clearance Center (CCC) Transactional Reporting Service. The appearance of a code line at the bottom of the first page of an article in this journal indicates the copyright owner's consent that copies of the article may be made for personal or internal use. However, this consent is given on the condition that the copier pay the flat fee of \$5.00 per copy per article (no additional per-page fees) directly to the Copyright Clearance Center, Inc., 27 Congress Street, Salem, Massachusetts 01970, for all copying not explicitly permitted by Sections 107 or 108 of the U.S. Copyright Law. The CCC is a nonprofit clearinghouse for the payment of photocopying fees by libraries and other users registered with the CCC. Therefore, this consent does not extend to other kinds of copying, such as copying for general distribution, for advertising or promotional purposes, for creating new collective works, or for resale, nor to the reprinting of figures, tables, and text excerpts. 0030-770X/86 \$5.00

OXIDATION OF METALS

Vol. 25, Nos. 1/2

February 1986

CONTENTS

Effect of Yttrium on the Sulfidation Behavior of Ni-Cr-Al Alloys at 700°C	1
<i>E. J. Vineberg and D. L. Douglass</i>	
Effect of Y ₂ O ₃ Dispersoids in 80Ni-20Cr Alloy on the Early Stages of Oxidation at Low-Oxygen Potential	29
<i>D. N. Braski, P. D. Goodell, J. V. Cathcart, and R. H. Kane</i>	
The Kinetics and Mechanism of Manganese Sulfidation	51
<i>M. Danielewski</i>	
Effect of NaCl Vapor on the Oxidation of Ni-Cr Alloys	83
<i>R. D. K. Misra and R. Sivakumar</i>	
Internal Oxidation of Fe-Al Alloys in the α -Phase Region	93
<i>Jun Takada, Sadahiro Yamamoto, Shiomi Kikuchi, and Masao Adachi</i>	
Sulfidation Behavior of an Aluminum-Manganese Steel	107
<i>N. S. Quan and D. J. Young</i>	

OXIDATION OF METALS

Vol. 25, Nos. 3/4

April 1986

CONTENTS

Preferential Oxidation of Carbon During the Initial Stage of Oxidation of an Fe-0.8% C Alloy at 400°C <i>E. Nosek and T. Werber</i>	121
Studies on the Hot Corrosion of a Nickel-Base Superalloy, Udimet 700 <i>Ajay K. Misra</i>	129
Selective Oxidation of Fe-30Cr at Low Temperatures: 743-823 K <i>Masahiro Seo, Gunnar Hultquist, Fumio Baba, and Norio Sato</i>	163
Observations on the Role of Oxide Scales in High-Temperature Erosion-Corrosion of Alloys <i>I. G. Wright, V. Nagarajan, and J. Stringer</i>	175
Cyclic Oxidation Behavior of Ni ₃ Al-0.1B Base Alloys Containing a Ti, Zr, or Hf Addition <i>Shigeji Taniguchi and Toshio Shibata</i>	201
Corrosion of Nickel with Small Alloy Additions of Si, Fe, and Mn in SO ₂ +O ₂ /SO ₃ at 700°C <i>Bent Haflan and Per Kofstad</i>	217
The Air Oxidation of an Austenitic Fe-Mn-Cr Stainless Steel for Fusion-Reactor Applications <i>D. L. Douglass, F. Gesmundo, and C. de Asmundis</i>	235

OXIDATION OF METALS

Vol. 25, Nos. 5/6

June 1986

CONTENTS

Transition from Internal to External Oxidation for Binary Alloys in the Presence of an Outer Scale <i>F. Gesmundo and F. Viani</i>	269
Reactivity of Ni20Cr30Al Metallic Felts with S ₂ <i>G. Pohl and S. G. Toesca</i>	283
Theoretical Considerations on Phase Boundary Reactions and Mass Transfer During the Oxidation of Iron <i>W. Schwenk and R. Rahmel</i>	293
Kinetics of Copper Sulfidation at Temperatures 570–1123 K <i>I. Bartkiewicz and A. Stokłosa</i>	305
Oxide Morphology and Adherence on Dental Alloys Designed for Porcelain Bonding <i>J. R. Mackert, Jr., E. E. Parry, and C. W. Fairhurst</i>	319
High-Temperature Corrosion of Dilute Chromium–Lanthanum Alloys <i>F. N. Tavazze, O. I. Mikadze, N. P. Keshelava, and B. P. Bulia</i>	335
An Experimental Setup for the Study of Gas-Solid Reequilibration Phenomena <i>Francois Morin</i>	351
Selective Oxidation of FeCr Alloys in the 295–450 K Temperature Range <i>Gunnar Hultquist, Masahiro Seo, and Norio Sato</i>	363
Corrosion of Metals and Alloys in Sulfate Melts at 750°C <i>Ajay K. Misra</i>	373
Near Surface Elemental Concentration Gradients in Annealed 304 Stainless Steel as Determined by Analytical Electron Microscopy <i>P. M. Fabis and B. S. Covino, Jr.</i>	397
The Healing Behavior of Protective Oxide Scales on Heat-Resistant Steels After Cracking Under Tensile Strain <i>M. Schütze</i>	409
Author Index for Volume 25	423
Subject Index for Volume 25	425

Instructions to Contributors

1. Manuscripts should be sent to:

Prof. D. L. Douglass
Materials Department
Room 6531, Boelter Hall
University of California at Los Angeles
Los Angeles, California 90024
2. Submission is a representation that the manuscript has not been published previously and is not currently under consideration for publication elsewhere. A statement transferring copyright from the authors (or their employers, if they hold the copyright) to Plenum Publishing Corporation will be required before the manuscript can be accepted for publication. The Editor will supply the necessary forms for this transfer. Such a written transfer of copyright, which previously was assumed to be implicit in the act of submitting a manuscript, is necessary under the new U.S. Copyright Law in order for the publisher to carry through the dissemination of research results and reviews as widely and effectively as possible.
3. Type double-spaced, and submit the original and two copies (including, where possible, copies of all illustrations and tables).
4. An abstract of 150 words or less is to be provided.
5. A list of 4-5 key words is to be provided directly below the abstract. Key words should express the precise content of the manuscript, as they are used for indexing purposes, both internal and external.
6. Illustrations (photographs, drawings, diagrams, and charts) are to be numbered in one consecutive series of Arabic numerals. The captions for illustrations should be typed on a separate sheet of paper. Photographs should be large, glossy prints, showing high contrast. Drawings should be prepared with india ink. Either the original drawings or good-quality photographic prints are acceptable. Identify figures on the back with author's name and number of the illustration.
7. Tables should be numbered and referred to by number in the text. Each table should be typed on a separate sheet of paper.
8. References should be made by using superscript Arabic numerals, and the full references should be given in a list at the end of the paper. For maximum clarity, abbreviations should be avoided in the references. Whenever a book is cited, the number of the relevant chapter should be given.
9. In general, *Oxidation of Metals* follows the recommendations of the American Institute of Physics in their *Style Manual*, and it is suggested that contributors refer to this publication.
10. **The journal makes no page charges.** Reprints are available to authors, and order forms are sent with proofs.

OXIDATION OF METALS

Vol. 26, Nos. 5/6

December 1986

CONTENTS

High Temperature Oxidation of Metals under Time-Dependent Gas Pressure <i>M. Tomellini and D. Gozzi</i>	305
The Formation of Multilayer Scales on Pure Metals <i>H. S. Hsu</i>	315
Sulfur Effects on the Internal Carburization of Fe-Ni-Cr Alloys <i>J. Barnes, J. Corish, and J. F. Norton</i>	333
An ^{18}O Tracer Study on the Growth Mechanism of Alumina Scales on NiAl and NiAlY Alloys <i>E. W. A. Young and J. H. W. de Wit</i>	351
High-Temperature Oxidation of A Rapidly Solidified Amorphous Ta-Ir Alloy <i>Catherine M. Cotell and Gregory J. Yurek</i>	363
High Temperature Oxidation of Ni-20Cr-12.5Al Coatings Containing 1% Dispersed Oxides <i>Krishan L. Luthra and Ernest L. Hall</i>	385
Mechanism of Adhesion of Alumina on MCrAlY Alloys <i>Krishan L. Luthra and Clyde L. Briant</i>	397
Effect of Scale Constitution on the Carburization of Heat Resistant Steels <i>S. P. Kinniard, D. J. Young, and D. L. Trimm</i>	417
The Initiation of Breakaway Oxidation of Fe-9Cr-1Mo in a High Pressure CO_2 Atmosphere <i>S. B. Newcomb and W. M. Stobbs</i>	431
Author Index for Volume 26	467
Subject Index for Volume 26	469
